

Project Report  
Evaluation of the Impacts  
of the IDRC-Supported Research Project  
on Public Health

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	Content	Page
Part I	Introduction	
1.1	Background	1
1.2	Evaluated research projects on medicine and public health	1
1.3	Evaluation purpose	1
1.4	The evaluation models and the means for the presentation of evaluation results	2
Part II	Evaluation Results	
project No.1	Supplementary Food Project	
2.1	Major elements of the project	4
2.2	Achievement of objectives	5
2.3	Other results	9
2.4	Conditions (Reasons) for success	9
2.5	The application of results	12
2.6	Usefulness of the project	12
2.7	Production of technology	13
2.8	Extension and implementation	14
2.9	Information	15
2.10	Implementation Policy	15
2.11	Potentials	16
Project No.2	Improvement of Dermatological Practice	
3.1	Important elements	18
3.2	Achievement of objectives	19
3.3	By-products	19
3.4	Conditions for success	19
3.5	Application of results	20
3.6	Benefits of the project	20
3.7	Production of technology	20
3.8	Extension of the project's results	21
3.9	Information	21
3.10	Policy obtained from the project	21
3.11	Potentials in business	22
Project No.3	Development of Appropriate and Economic Ireatment System for Hospital Waste-Water	
4.1	Important elements	23
4.2	Achievement of objectives	23
4.3	Unexpected outcomes of the project	26
4.4	Conditions for success	26
4.5	Application of results	27
4.6	Benefits of the project	27
4.7	Production of technology	27
4.8	Extension of the project's results	27
4.9	Information	28
4.10	Policy obtained from the project	28
4.11	Potentials	29

Content	Page
Part III Conclusion and Recommendations	
5.1 Produces and products	30
5.2 Techniques and approaches	30
5.3 Policy	32
5.4 Information	32
5.5 Population and community health	33
5.6 Extension of the research projects	33
5.7 Business potentials	33
5.8 Recommendations	33
Appendix 1.1	
Papers Used to Study the Project Background	35
Appendix 1.2	
Informants	37
Appendix 1.3	
Possible Indicators for Evaluation	39
Appendix 1.4	
Questionnaire Used in Evaluation of Impacts	40
Appendix 2.1	
Time/Work Schedule for the Food Supplementary Project	43
Appendix 2.2	
Supplementary Formula or Supplementary Food Mixture	45
Appendix 2.3	
Maintenance Table for the Waste Water Treatment System	46
Appendix 2.4	
Comparision of Advantages and Disadvantages of Anaerobic Filter System ,Oxidation Ditch (Aerobic), and Stabilization Ponds	47

## Part I Introduction

### 1.1 Background

The International Development Research Centre of Canada and the Department of Technology and Economic Cooperation have conducted the evaluation of the impacts of the research projects supplemented by IDRC during May 1987 February 1988.

The research projects on medicine and public health being evaluated would be applicable to:

1. the modelling of other projects,
2. the setting up of policies, or the attaining of procedural models.

### 1.2 Evaluated research projects on medicine and public health

Following is the list of the projects being evaluated

#### 1. Food Supplement Projects:

a) Village food production and processing outreach (Phase I), conducted by Aree Valyasevi, M.D., D.Sc., Sakorn Dhanamitta, M.D., D.Sc., and Somjai Wichaidit, Ph.D. The project's site was in Ubon Rajthani. The implementation period was 26 months (1979-1981), and

b) Food processing centres (Phase II), conducted by Aree Valyasevi, M.D., D.Sc., Sakorn Dhanamitta, M.D., D.Sc. and Somjai Wichaidit, Ph.D. The project's site is in Ubon Rajthani. The implementation period is 30 months (1981-1984).

2. Improvement of dermatological practice in Thailand, conducted by Renoo Kotrajaras, M.D. The project's site is in Bangkok and upcountries. The period of project is 15 months.

3. Development of appropriate and economic treatment system for hospital wastewater, conducted by Mrs. Nitaya Mahabhol and Mr. Pipop Phatchasaphansakul. The project's site is in Ayudhya and the project period is 3 years (1983-1985).

### 1.3 Evaluation Purpose

The general purpose was to find out:-

1. Whether the projects were completed, what had been completed, how were they accomplished, what still remained and why.

2. The research results, information, and implementation; and their direct and indirect application.

3. The potentials of the research results and implementations towards business enterprises.

### Specific Objectives

1. To find out whether the projects achieve their objectives.

2. To find out the arising impacts:

2.1 as stated in the objectives.

2.2 other impacts.

3. To study the conditions leading to the projects' achievement and failure.
4. To determine the arising technology.
5. To determine the benefits of the projects.
6. To see that there is an application of research findings.
7. To find out if the research information is used, or disseminated to others.
8. To find out if there is an attainment of policies, approaches, and suggestions.
9. To find out if there is an indirect or direct use of the research findings, eg., as models for other projects, for setting up policies, etc.
10. To see if the project implementation leads to the setting up of policies.

The evaluation results would be beneficial to:

1. The project supplementers.
2. The project implementers.
3. Relevant personnel and target groups.

1.4 The evaluation models and the means for the presentation of evaluation results.

1. Each project was evaluated separately, emphasizing the content of :
  - 1) project background
  - 2) evaluation procedures
  - 3) direct and indirects results of project
  - 4) suggestions
2. The steps in evaluation included:
  - 1) Review of documents concerning base-line data, objectives, activities, work results, trainings, dissemination of work results, determination of variables and indicators, criteria used to indicate success and failure, project cost/benefit (Appendix 1.1)
  - 2) Interviewing project implementers, workers, and relevant personnel (Appendix 1.2)
  - 3) Observation of arising factors both in the project areas and relevant areas.
  - 4) Study of the application of research activities and results eg., the extension development of results, the cooperation of and approval by community, the impacts on the target group.
  - 5) Comparison of variables and indicators between the arising results and base-line data (if any) using when possible the indicators attained from the workshop "The construction of Models to Evaluate the Impacts from Projects Supplemented by IDRC" which was held on November 14-15 1986, by the DTEC (Appendix 1.3)

An information-recording form was prepared in order to record observed and interviewed data.

3. conclusion of results from all projects

This was carried out in order to:

- 1) see the applicability of the research findings.
- 2) see to the possibility of future implementations of research technology by the institutions or sectors concerned.

## Part II Evaluation Results

### Project No.1 Supplementary Food Project

#### 2.1 Major Elements of the Project

##### 2.1.1 Village Food Production and Processing Outreach Project

The Nutritional Research Institute of Mahidol University has a duty to promote research and development on food and nutrition.

The important malnutrition problem in Thailand was found to be that of protein energy malnutrition (PEM), notably before 1979. This PEM condition was found in 70% of pre-school children (less than 6 years of age). The researchers believed that the consumption of supplement food, which was a mixture of glutinous rice, beans and sesame at a ratio of 70:15:15 could prevent PEM in pre-school children. The food mixture should be given to children as they were still infants. However, it had to be accepted by the target group.

The aim of village food production and processing outreach project was to find out the convenience of production and the acceptance of various supplementary foods at a village level. The detailed objectives were:

- 1) To see if there was an acceptance of various formulas of supplementary food production in the villages.
- 2) To see if supplementary foods were accepted.
- 3) To see if there was a need to establish food processing centre (EPC) in the villages.

The project's site covered Ban Nong Hai at Amphur Piboonmangsaharn and Ban Dang, Ban Lai Sung at Amphur Trakarnpuetpon, Ubonrajthani.

The criteria for selection of the three villages in Trakarn restrict were:

1. Availability of irrigation or water supply.
2. Presence of a health center, and
3. Presence of "village leader"

The researchers agreed when the project was nearly completed that nutritional status of infants and pre-school children in the three villages at Amphur Trakarn was not improved. It was found that children who were not mal-nutritioned at the beginning of the project became mal-nutritioned when the project was at the final stage. Thus, a research project had to be conducted to study the distribution and the marketing of supplementary food formula; in order that the formula was accesible to all target groups.

##### 2.1.2 Food Processing Center Project

This project which was conducted at Ban Nong Hai and at 9 other close-by villages aimed at determining the cost-benefit of village food production and processing, and at developing economically and socially viable systems

of production and marketing of infant-formula supplementary food which was produced at the villages' food processing centers (FPC). Following are the detailed objectives

1) To determine the cost-efficiency and efficacy of established FPC at Tambon and Village levels.

2) To see if there was any possibility of using a village FPC for the near villages.

3) To determine the operational requirement of FPC which could be used by the villagers.

4) To determine the economic feasibility in the marketing of supplementary food for infants which was produced at Ban Nong Hai, supplying Ban Nong Hai and the nine close-by villages. (Totalling 10 villages of Phase II project's site).

5) To determine the other requirements of consumers of supplementary food formula.

6) To find out the impacts on the nutritional status of infants. The target population of the project consisted of:

1) Children younger than 6 years (The word 'infant' was used for children below 2 years, and 'preschool children' or 'preschoolers' for children from 2 to 6.)

2) The mothers of these children, and

3) Pregnant women and breast-feeding mothers.

The project was conducted by :

1) Three project leaders.

2) One field director and 4 assistants working at the project's site.

The basic approaches of the project were

1) Familiarity with villagers in the project's site.

2) Approaching local officers (at Tambon, district, and town levels) whose assistances were needed.

3) Formulating a supplementary food formula with a mixture of rice, bean, and sesame.

4) Studying the acceptance of experimented food formula.

5) Promoting the use of supplementary food formula, its marketing, and advertisement through video, radio, and public service announcements.

The implementing period and activities are shown in Appendix 2.1

## 2.2 The Achievement of objectives.

The following elements had been achieved:-

1) Supplementary food formula (glutinous rice + mung bean or soy bean + sesame or ground nut, 70:15:15 by weight) which had been used during Phase I and II of the project.

2) A test had been conducted with a group of preschoolers at Ubonrajthani before project implementation



to see if they would eat this supplementary food. It was found that over 90% of this group would eat it.

3) The experimented food processing centers (FPC) at Ban Nong Hai, Ban Dang, Ban Lai Tung, and Ban Lai Sung were used by project officers, local officers, community leaders, and villagers.

4) There was a possibility of acceptance of supplementary food formula production by villagers, using indigenous raw materials (rice, beans, and sesame), and simple equipment to roast and grind, which could easily be found in the household and also available at the FPC.

5) Village FPC proved to be useful for project implementation of the following activities:

- House wives gathering
- Cooperation in the production of supplementary food formula (roasting, grinding, packing)
- Provision of health care and nutritional education
- Cooking of high-nutrition food eg., of meat and vegetable for children.
- Demonstration of various occupational processes to increase the income of the villagers.

6) It was found that dissemination of formula supplementary food among the population needed some marketing techniques which were beyond the capacity of this project.

7) It was found that there was a demand of 170 to 700 bags of supplementary food formula per month while the project could produce from 200 to 800 bags/month (during project period).

8) 10% of target population consumed supplementary food formula.

9) The children in the target population who were at stage 2 and 3 of malnutrition had a better nutritional status after 3-4 months of feeding with supplementary food formula.

10) It was found that production of 2,000 bags of supplementary food formula would reduce the initial cost of production. (The price was not recorded)

There were some elements which had not been achieved:

1) The cost-efficiency in the setting up of FPC could not be determined.

2) The quantitative analysis of operational requirement of village FPC could not be carried out.

#### Supplementary food formula

The project succeeded in formulating seven formulas of supplementary food. (see Appendix 2.2). The formulas were tested with a sampled group of preschoolers in Ubonrajthani. Over 90% of the children would eat formulas with a mixture of glutinous rice, soy bean (or mung bean), and sesame (or groundnut) at village FPC, during the period of project

implementation, with participation from the preschoolers' mothers. The supplementary food produced was advised to be mixed with meat and vegetable.

During Phase I of the project, malnutrition conditions could be improved among preschool children at Nong Hai. At the other villages, they were not improved which could be due to other factors such as the mothers were busy with their occupations.

It should be noted that during Phase I of the project, the supplementary food formula was distributed free to the villagers. After this, they rarely consumed it, which could be because:

- 1) They did not have enough time.
- 2) Some raw materials were not available in the villages, eg. beans and sesame.

In addition to this, some villagers had been familiar with high-quality supplementary food which readily mixed with water and would buy this commercial supplementary food if they could afford it.

#### Food processing centers

The FPC was set up in each village during Phase I of the project, having a project implementer as the FPC's manager who carried out the following activities with the villagers:

- Providing health care service
- Providing nutritional education
- Introducing planting techniques and animal farming
- Introducing weaving techniques
- Producing and packing supplementary food formula (100, 250 g.)
- Catering for preschoolers who were taken to the center.
- Distributing supplementary food formula
- Producing other nutritional food, eg., soy bean milk, soy bean cookies, mung bean products, groundnut products
- Demonstrating preservative processes eg., dry fish, vegetables, fruits ; prickles.
- Weighing children every month, teaching the mothers about weight and nutritional status.

At the FPC, equipment such as a hand grinder, cookers and cooking utensils were provided.

The health economic agricultural officer, health officers, nutritional workers, and project implementers used FPC as a place to demonstrate cooking of high-nutrition food.

It should be noted that when the project ended, the FPC's were scarcely used to produce supplementary food formula.

#### Supplementary food for children

Besides the supplementary food formula (rice + bean + sesame), introduction was made for the villagers to feed their children with nutritional food apart from their

simple food. These were soy bean milk and cookies.

Usually, Northeast children have two meals at home where they are fed with glutinous rice and fermented fish. The project had introduced them to grow vegetables and farm animals or fish, so that the villagers would also had nutritional food to eat. They would come to FPC to cook together, and this activity is still practised today.

#### Promotion of local food production

In order that the villagers had enough vegetables, fruits, and meat to consume; the project (with development workers, agricultural officers, etc.) advised and encouraged them to grow vegetables and fruits, to raise poultry and to farm fish.

The villagers at Ban Nong Hai grew groundnut, mung bean, developed fish farming and second crop production.

At Ban Lai Tung, there were duck farming and fish farming.

At Ban Dang, there was planting of mung bean, groundnut, sesame, malberry and pepper.  
etc.

Some still practise these agricultural processes after the project ended with a support from development workers and agricultural officers.

#### Feeding activities

During the project implementation period, the children came to eat at FPC 1-3 times a week. The Children were weighed and recorded so as to evaluate the results of supplementary food formula feeding. The mothers of stages 2 and 3 malnourished children were encouraged to bring their children to FPC. Stage 1-malnourished children and other children could come at their convenience. The mothers were asked to bring with them to the center the raw materials (if they had any).

#### Nutritional education and health care services

Nutritional education and health care services were introduced to the villagers through personal relationships among individuals, using various media, and were especially successful at Ban Non Hai. The project's nurses could provide a lot of health care services to the villagers who appreciated the activities greatly.

#### Motivation

Encouragement was made to the mothers of preschool children to join the project. This was achieved through many means to make them realize the usefulness of supplementary food formula.

#### Collection of data and evaluation

At the beginning stage, base-line data were collected by recording age, weight, height of every preschooler so that the data could be used to evaluate nutritional status of the target population. Other data such as FPC's daily

activities, production of supplementary food formula, follow-up of children's growth, etc., were recorded for later evaluation.

### 2.3 Other results

1) Income generation for villagers. Most of villagers in North-eastern part of Thailand were poor. To get nutritious food they must earn more money to buy food or raising raw food materials. The project initiated home industry, home gardening, fruit growing, building of fish ponds, and poultry raising in the villages. The project also motivated cooperative and marketing to reduce the villagers' expenditure.

2) Establishment of group-processing for village development in many aspects particularly production of hand bag, and poultry raising.

3) Motivation of interest in working for the villages.

4) Getting a pattern or model of producing and distribution of the supplementary food formula. The project tried to push this model or its modification to be the nation's programmes for correction of malnutrition.

5) The supplementary food formula was used by adults-- mixing in their daily meals.

6) It was found that the supplementary food formula was useful for patients and old persons.

7) Getting participation from local government officers, community leaders, village volunteers, and villagers.

8) The educational authority has been understanding the need of supplementary food in children, and programme for food supplement. Therefore additional school lunch programme were started for school children.

9) The project's activity motivated the Nong Hai's district (community) hospital to join the programme and carried out the community activities such as up-grading the mobile unit, having immunization programme in the project's site (Ban Nong Hai), and initiating the hospital's supplementary food activity in other villages. Unfortunately, these activities could not be continued.

10) Having the project in Nong Hai made the Ubon's Provincial Health Office send local health officer to work in the village.

11) The project could make some women in the villages to be community leaders/teachers, particularly in Ban Dang. One of them became a resource person (with the community development unit) for teaching in other districts and provinces.

12) The results of group-processing in Ban Dang initiated by the project could make BAN Dang to be selected as the "ASEAN's women village".

### 2.4 Condition (Reasons) for success

#### 1. Familiarity

The projects were conducted as a continuing

process of many previous projects. The project's workers were familiar with the villagers and local officers. Motivation of villagers and local officers to cooperate in the projects' activities and functions was easy.

2. Methods of community approach

This project use medical and health care service, claimed by the project's leaders as an efficient spearhead for approaching the communities, to gain popularity from the villagers.

3. Cooperativeness

During the period of the project there were joint activities among the project's workers and villagers with support from local officers particularly the activities demanded by the community.

4. Situation analysis and built-in evaluation

The project studied demand and supply of the raw materials, distribution channels of products, and many important situations for launching and management of the project. Cost of production, promotion and distribution of products, rate of production and acceptability of supplement formula were also studied by the management of the project.

5) Good planning

The projects were planned and implemented with compliance from the villagers and village leaders to ensure community participation and self reliance.

6) Simplicity and availability of local materials

"The processing method bases on using kitchen utensils available in villages and simple equipments, such as tin plate, iron pan and simple grinder. The steps in processing done by the project worker was simple and practical (roasting, weighing and grinding). Supplementary food formula and the supplement food for children used local available raw materials with low cost and high nutritive value.", said the project' workers.

7) Modification and improvement

During the project time, evaluation of activities and results were done continuously. The results of evaluation made project's leaders and workers modify and improve their activities, equipments and rearrange the time schedules and work load.

8) Income Generation

There were activities to produce income generation (to support family expense and making power to buy materials to produce supplementary food formula) conducted in the project's sites.

In Nong Hai : introduction of high yield silk worm, promotion of modern looms to facilitate weaving of silk, promotion of cloth dyeing, batik-making, and making

blankets from unused pieces of clothes.

In the other 3 villages at Trakarn District; promotion of high yeild silk worm, weaving of baskets and blacksmith.

These activities were initiated by the project with supports from local community development officer as well as officers from other sectors i.e., agriculture, adult education, home industry, etc.

Besides the above conditions, it was found that giving the supplementary food formula, free of charge, made the villagers consume the product. After the project ended villagers have many reasons for stopping production of the supplement formula.

#### Conditions (Reasons) of failure

During the project time, the villagers accepted the supplementary food formula. When it was not free of charge they stopped using the formula.

The project learnt that supplementary food formula could not be produced for marketing. Only 10% of target population (infants and preschool children) consumed the formula. Demand of the products was low because of low purchasing power and lack of awareness of the important of supplementary food by the rural mothers and lack of promotion and marketing techniques. Cost of production could not be reduced because of low demand of products. Only 170-700 packages could be distributed from the total production rate of 200-800 packages per month. They also learnt that the children did not continue eating the supplementary food formula because of its texture and taste.

Their reasons for not producing and using the supplementary food formula are:

- 1) preparation is not easy,
- 2) not tasteful,
- 3) sesame is not available in the village, and
- 4) time consuming in preparation for a child in the family.

A village health volunteer said "At present, rich villagers buy Similac known from advertising. Some villagers use mung bean and soy bean for their dessert. Soy bean milk was made occasionally in small amount because they don't have refrigerator."

Another failure learnt from this project is inability to build habit for eating supplement food.

In conclusion, causes of failures are

- 1) Lack of motivation
- 2) Lack of self reliance
- 3) No continuation

- 4) (Unwanted) Habit
- 5) Lack of raw materials

## 2.5 The Application of Results

The research results were applied by the governmental institution where the project implementers worked. The results were submitted to the Ministry of Public Health. The Ministry then arranged a seminar at UbonRajthani, by a support from the World Bank. The model was applied in 90 villages in NakornRajsima, Udornthani, UbonRajthani, and then in needy villages all over the country with a budget of ~~฿~~ 3,000 per village.

## 2.6 Usefulness of the project

The projects have been very useful to the project's leaders, co-workers, field workers, and others.

The project's leaders have understood and increased their experience in many aspects for their eventual researches, teachings and management. The results and extension of the projects, particularly at national and international levels, supported the progress of leaders and, more or less, awarded them high honors such as "The award of prominent national researcher in medical science" and "Mac Say Say Award" received by the principle researcher.

Most of the project's co-workers and field workers got understanding and good experience. Ones who worked closely with villagers gained popularity and faith from them.

Villagers said "We have got many things from the projects. Children have good health and clever than before. We have more home gardening and poultry raising. Today our incomes are higher than before."

Local government's offices which participated and supported the projects got technical knowledge and experience as well as information to be used in their works. The local health officers related to nutrition, maternal and child health, health promotion and extension, and other units for food and nutrition in Ubol brought concept, strategy, methods or results of the projects to implement, extend, or start their works.

The 5th and 6th National Economic and Social Development Plans put importance of promotion of supplementary food to children in the plans. The national committee for food and nutrition for such national 5th and 6th plans brought the results of the projects for consideration in the planning of the national plans.

Ministries of Interior, Education, Agriculture, and Public Health used principles and methods of Village mothers' group-activity, initiated from the projects, for modification of their activities and applied in their works in communities.

The school lunch programme giving additional (supplement) food to school children 2 or 3 days in a week is the by-product of this food supplement project.

## 2.7 Production of technology

Technique of getting cooperation from villagers

The project's leaders and workers used medical and health care as well as nutritional education as the spearhead to introduce them and their project to the villagers. With familiarity and good relationship and attitude between project's workers and villagers the project could run smoothly. The project could obtain support from village leaders, volunteers and local government officers. The project's leaders and workers learnt that important elements are health, nutritional education, and food supply.

### 1) Health

- need promotive as well as curative and preventive actions

### 2) Nutrition education

- early introduction
- regular and continuing
- in combination with Health education

### 3) Food supply

- nutritious crop
- cash crop
- supplementary food prepared in families and villages

They also learnt the relationship of these element and the results provided from individual and combination of such elements.

## Planning and management at village level

With the project, the project's workers studied, conducted, and gained experience in the management of the following bodies and processes:

- village organization
- manpower development
- village funds
- appropriate technology
- skill management

The major implementation techniques obtained from the project which had been applied were

- 1) The point of view concerning the necessity for children to eat supplementary food was applied in schools where supplementary food was prepared 2-3 days per week.



2) The production techniques and dissemination of supplementary food which should be carried out at a community level, not in the central part.

The implementers of these techniques were

1) The Division of Nutrition, Ministry of Public Health

2) Home Economic Agriculture, the Department of Agricultural extension, Ministry of Agriculture.

3) The Department of Community Development, Ministry of the Interiors.

## 2.8 Extension and implementation

The projects' leaders and workers had extended the projects' results. There were:

1. Study the establishment of supplementary food formulas and modification of distribution techniques in villages.

2. Conducting a workshop among departments of Health, Agriculture, Education, Community Development and University.

3. Implementation of pilot project of nutrition (using Rice + Legume + Sesame or Groundnut) in primary health care at 3 provinces (Ubol, Udon and Korat) supported by World Bank managed by Health Department.

4. Study for development of 4 important elements (emphasis on nutrition education) by Institute of Nutrition of Mahidol University (INMU) and Ramathibodi's Research Centre.

5. Study to improve texture, taste and favoring of supplementary food formulas.

6. Improving the equipments for processing and production of supplementary food formulas.

7. Improving method for cooking the supplementary food formulas.

8. Study the cost-effectiveness of production at sub-district level.

9. Development of basic Minimum Needs in Nutrition.

10. Study communication for behavioral changes using video tapes in comparison to Radio.

11. Study the most important component in effective nutrition programme.

12. Study anthropological and sociocultural aspects. strategy and model for development of food habits.

13. Development of appropriate nutrition surveillance system.

14. Implementation of nutrition programme through integration effort of the 4 sectors (health, education, agriculture and community development).

In order that the research results were applied at a wider scale, the project implementers had taken a group of interested people to the project's site, or given

lectures in seminars and trainings. The dissemination was also done through publication of research results in journals in Thailand and abroad.

## 2.9 Information

Information was available on the following aspects, through arrangements of seminars, workshops, study tours, discussions, etc.

1. Implementation, results, problems, obstacles, etc. for the World Bank's consultant and the officers from the four ministries involved in supplementary food projects, etc.

2. Raw materials, for Khon Kaen University.

3. The development of tools for the production of food, for chulalongkorn University.

4. The study of cost-effectiveness, for Thammasart University.

5. Research results, for the participants at the Third Nutrition Congress, Bangkok 1979.

6. Research implementation methods and findings, for nutritional practitioners at various villages in Ubonraithani, and to personnel from different departments and sectors, both in the country and abroad.

7. Techniques and results of village food production and processing for the four sectors through workshops and study tours.

8. The integration effort of the four sectors imitating Nong Hai's model.

9. The models of production and distribution techniques of supplementary food at a village level, for doctors, nurses, nutritionists of relevant sectors.

10. The production and distribution of supplementary food and integrated implementation models for doctors, nurses, and nutritionists at a provincial level and a regional level.

11. The application of research results for the Ministry of Public Health and local officers.

12. The application of research results for the World Bank's representatives and others.

13. The dissemination of research results in the international conferences and workshops.

14. The dissemination of research results through publication in bulletins and conferences' proceedings.

## 2.10 Implementation Policy

The policy derived from project implementation was to improve the nutrition of children from their traditional practices.

The model has been modified and adapted for national action program for food and nutrition by the

Ministry of Health since 1981.

Policy Implementers:

1. The Division of Nutrition, Ministry of Public Health
2. The Nutritional Research Institution
3. The National Board of Nutrition and Food Planning
4. The National Board of Food and Nutrition Research
5. The other agencies and departments concerned with food and nutrition, both governmental and non-governmental.

The project is useful to the policy makers such as the National Economic and Social Development Council and the Ministry of Public Health who could make the policy stand at

- an international level through international seminars, articles in international journals.
- a national and regional levels through seminars, workshops, mass media
- a provincial level through information distribution and training.
- a district level through training
- a village level through encouragement of idea and training.

An implementation system was obtained from this project, and was applied by:

- 1) The four ministries as mentioned.
- 2) The 1980-1981 Pilot Project of Nutrition in Primary Health care at 3 Provinces (Ubon, Udorn, Korat) involving 30 villages, and being supported by the World Bank.
- 3) Tambon officers and village committees.

## 2.11. Potentials

It was said that results and work of the project have potential for production of supplementary food formula if research in food habit and feeding pattern for identifying recipes of the formulas have been done, and the texture, flavour, and taste of the formula are improved.

Some project implementers saw no potential in the results since:-

- 1) Certain raw materials were rare (sesame, beans) and more expensive than local meat.
- 2) The smell and flavour of supplementary food formula were not nice.
- 3) If the supplementary food formula was to be

produced on a commercial scale, it had to be proceeded through clever marketing techniques to be able to compete with other foods.

4) If commercially produced, it would not be accessible to the target group who had no purchasing power.

5) The selling of the produced food had to rely on administrators who were experts in marketing.

However, the research results could be indirectly used, eg., adapting the production equipment for factory use, provided the formula was accepted among the villagers.

## Research Project No.2 Improvement of Dermatological Practice

### 3.1 Important Elements

The Institute of Dermatology is under the Department of Medical Services, Ministry of Public Health. In Thailand, a large number of population still have skin diseases even though most of these diseases can be prevented and their treatment is very simple, not requiring any specialist in dermatology.

The leader of this project was the Director of the Institute, who believed that treatment and prevention of skin diseases were possible by 1-month, 3-month, or 6-month trainings for the general practitioners.

The project aimed at improving dermatology practice in Thailand with the following objectives:

- 1) To study the occurrence of skin diseases in Thailand from information gathered from 18 provinces including Bangkok.

- 2) To make doctors in general realize the importance of skin diseases relating to physical and mental conditions, economic and social status of the patients.

- 3) To promote doctors' capacities in diagnosing, preventing and managing skin diseases, using a common skin diseases manual and the patients case history.

- 4) To promote the transfer of patients with skin diseases by organizing training and research for provincial hospitals.

The target groups consisted of:

- General physicians
- Patients with skin diseases in 18 provinces.

The target groups believed that the project was beneficial to doctors being trained, increasing their treatment abilities. Dermatological service was available to a larger number of population. Project implementation involved:

- 1) Designing the patient's case history record form (OPD card).

- 2) Producing a manual on common skin diseases.

- 3) Arranging 1-month training course for general physicians.

- 4) Arranging 2-week training course for nurses.

- 5) Collecting skin diseases data from 18 provinces to determine the incidence, prevalence, and descriptive statistics of skin diseases in Thailand.

Trainings had been arranged before IDRC's support. And when the project was completed, such trainings are still being organized.

### 3.2 Achievement of Objectives

The following aspects were achieved:

- 1) Production of manuals on common skin diseases.
- 2) Design of case history form for patients with skin diseases.
- 3) Trainings on skin diseases at the Institute.
- 4) Promotion of capacities of doctors in general in dermatological treatment.
- 5) Collection of skin disease data.
- 6) Attainment of statistics incidence, and prevalence of skin diseases in Thailand.

#### Patient's case history record form

The designed case history form can efficiently be used to record the patient's symptoms and should be used as a standard form for all hospitals. Analysis from data collected from this form showed that the statistics and epidemiology was more accurate.

#### Training

The results of the training were

- 1) The increased abilities of doctors and nurses in diagnosis of skin-diseased patients.
- 2) The trained doctors could improve the services offered at their hospitals.
- 3) The nurses worked more efficiently.
- 4) The transfer of patients from district hospitals to provincial hospitals was improved.
- 5) The collection of data was more accurate.

#### Manual on common skin diseases

This manual was used in the trainings and practical work of diagnosis and treatment of common skin diseases. The manual became useful to any doctors concerned with skin diseases.

### 3.3 By-products

- 1) Some doctors being trained had applied the methods in teaching the residents and students.
- 2) Some trainees introduced the patient's case history record form in their work, some had computerized these data.
- 3) Some trainees from Choburi exhibited the data to visitors at their hospitals.

### 3.4 conditions for success

- 1) Advices given in meetings
- 2) Experimentation
- 3) Determination of working trends
- 4) Implementation
- 5) Cooperation from various groups

6) Good leadership.

3.5 Application of results

1. The collected incidence, prevalence, and other statistical data of skin diseases were in the trainings, the diagnosis and treatment of the diseases, the planning of solutions to the problem, and the improvement of dermatological services.

2. The extension of work in provincial hospitals eg., the establishment of skin-disease section and services for the population.

3. The Institute of Dermatology extended the project by offering trainings and advices.

4. Exhibition of information.

5. The use of the patient's case history form in provincial hospitals.

6. Trainees applied the manual in their work.

7. At Cholburi Hospitals, the trainees brought the knowledge to teach their externs, students, and residents.

8. Doctors being trained applied the knowledge and gave information to interested people.

3.6 The Benefits of the Project

Benefits were obtained by

1) project's leader

2) co-researcher and project implementers

3) trainees

4) people

5) governmental sectors, eg., provincial hospitals, etc.

3.7 Production of Technology

Techniques were obtained in the training of general physicians and nurses and had been applied to the teaching of students and residents.

The Case-history form for skin-diseased patients

This technical form could very well be used in recording. The symptoms, statistics and natural history of common skin diseases in Thailand were obtained by the use of this form.

Computerized data processing

The data recorded in the patient's case history form should be computerized.

Manual on common skin diseases.

This manual helped in the improvement of diagnosis and treatment techniques.

Techniques obtained from the project:

- 1) Servicing techniques.
- 2) Techniques in arranging training courses.
- 3) Systematic working techniques.
- 4) The use of the newly-designed OPD card.

### 3.8 The Extension of the Project's Results

These project's results were disseminated all over the country:-

- 1) The manual of common skin diseases
- 2) The patient's case-history form
- 3) The skin disease information
- 4) The training techniques for doctors and nurses

The following dissemination of results were achieved:-

- 1) The trainees applied the obtained knowledge in their newly opened sections at the hospitals.
- 2) The organization of 6-month and 10-month international courses supported by JICA.
- 3) The organization of field trips to visit the trainees at some provinces.

This project should occasionally be repeated to increase the capacity of the general physicians.

### 3.9 Information

A lot of information was obtained:-

- 1) Information for the World Congress in Dermatology, Berlin (June 1987).
- 2) Information on the patient's O.P.D,
- 3) Information about patients with skin diseases.

### 3.10 Policy obtained from the project

The results could be turned into an international policy eg., for Nepal and Indonesia. At a provincial level, the policy was implemented by doctors being trained.

To make a policy, dissemination of results must be conducted eg., by publishing, arranging seminars, workshops, conferences, and presentation to administrators.

The project did not interest the policy makers because they had been interested in basic public health at that stage.



### 3.11 Potentials in Business

1. The results of the project could be applied in private hospitals and clinics.

2. The project could be of use in the organization of trainings in the future when support from the IDRC terminated.

**Research Project No.3**  
**Development of Appropriate and**  
**Economic Treatment System for Hospital Waste-Water**

#### **4.1 Important Elements**

It is very important to treat hospital waste-water since the water consists of contaminated matters and germs and can be harmful to the population if it is drained into public sewers. The Ministry of Public Health, therefore, has a policy for every public hospital to set up a self-treatment system of its waste water.

The Division of Environmental Health, Department of Health, Ministry of Public Health, has been responsible for the treatment of waste water from hospitals under the Ministry of Public Health since 1973. Its duty is to select and design an appropriate technology for the treatment of liquid and solid wastes from hospitals. Two systems are being used:

- 1) Oxidation ditch which is an aerobic treatment system used in 32 out of 89 provincial hospitals.
- 2) Stabilization ponds, using aerobic treatment system, are installed in 8 out of 296 community hospitals.

The shortcoming of the oxidation ditch is that it has a high operational cost while the stabilization pond requires a lot of land area.

This project aimed at trying another treatment system called upflow anaerobic filter, using 2 Imhoff tanks, 4 anaerobic filters made of ferrocement.

The specific objectives of this projects are:-

- 1) To evaluate the effectiveness of the hospital waste-water treatment in disposing of organic matters and enzymes.
- 2) To recommend criteria for the design of hospital's waste-water treatment using upflow anaerobic filters.
- 3) To compare the efficiencies of waste water treatment systems using upflow anaerobic filters, oxidation ditch, and stabilization ponds.
- 4) To conduct an economic analysis of the three treatment systems.
- 5) To collect information relating to the use of ferrocement, designing criteria, operation and maintenance of upflow anaerobic filter system in order to produce a manual for the operation and maintenance of equipment.

#### **4.2 The Achievement of objectives.**

The following objectives were achieved:

- 1) An upflow anaerobic filter system was

installed at Ayudhya Hospital. The components of the system are shown in the Project Papers, the main components being 2 Imhoff's tanks and 4 anaerobic filters (one is made of ferrocement).

2) There was an evaluation of the effectiveness in disposing of organic matters and enzymes in the waste-water. It was found that upflow anaerobic filter system was very effective.

3) The determination of criteria for the design of waste water treatment using upflow anaerobic filters for hospitals.

4) The collection and presentation of information relating to the design, construction, etc. of ferrocement anaerobic filter.

5) There was a collection and presentation of information relating to the operation and maintenance of upflow anaerobic filters.

6) A comparison was made on the waste water treatment efficiencies of the three systems: oxidation ditch, stabilization ponds, and upflow anaerobic filters.

7) An economic analysis of the three treatment systems was conducted.

Waste-water treatment using upflow anaerobic filters at Ayudhya Hospital

The system drained waste water from different buildings through a closed system having sediment tanks installed at intervals so that solid wastes deposited before the water flew into the Imhoff's tanks. The system was maintained by the hospital under the supervision of officers from the Division of Environmental Health. Two section of the hospital coordinated with these officers:

1) The general administration, responsible for the operation and mechanic.

2) The social and preventive medicine, responsible for technical advices and sanitation.

The coordination of officers from the two sectors was satisfactory. Maintenance duties were planned on charts for the hospital officers. (see Appendix 2.3)

Ayudhya Hospital reported that the maintenance cost was not high and was practicable. The hospital administrators all agreed that the system was a necessity for the hospital ; if the system stopped functioning, the hospital would be faced with a major problem.

It could be concluded that:

1) The hospital director was pleased with this waste-water treatment system, which created no problem during its 3 years of operation. He was not certain, however, of its performance after 5 years.

2) The hospital administrators admitted that the system was good. The area where there used to be dirty and contaminated water now has turned to beautiful gardens. Filthy smell has also been reduced.

Good aspects of the project

1) Less bacteria is detected in the water that has been treated.

2) The capacity of hospital workers has increased in the maintenance and operation of waste water treatment system.

3) Contamination of Chao Phya River is expected to be decreased because waste-water is no longer discharged into the river.

4) The sludge can be used as fertilizers for hospital's gardens.

5) There is no more filthy water in the hospital.

6) There is a better hospital scenery, with gardens and green yards.

7) There is no pungent smell as in hospitals where oxidization ditch or stabilization ponds are used.

Following is the list of some shortcomings:-

1) The pumping of dirty water into anaerobic filters needs to be done around the clock. Therefore, shifts need to be arranged for workers.

2) The addition of chlorine must be done through 24 hours. However, the former mixture tank could be used for 8 hours and needed to be changed to a bigger tank, so that the mixture is enough for 24 hours.

3) There used to be a blockage of the drainage because some patients dropped some hard stuffs in the drainage.

4) The components of the system at some points blocked the paths.

5) The slope of drainage is not adequate.

6) Sometimes, there was a blockage of fat at the overflow pipe.

There were opinions from some groups of people who believed the possibilities of future problems of the system.

1) The two pumps being used to pump waste water into the anaerobic filters could possibly be out of order from overuse. If both pumps were out of order at the same time, a problem would occur.

2) If the system stopped functioning for 2 weeks, problems would occur all over the hospital.

3) The Eslon pipes used to drain waste water into the tank could possibly leak in the future.

4) The Director of the hospital noticed that the piping and construction of wells could possibly obstruct building extension in the future.

5) The Director was not certain of the draining capacity of drainage during heavy downpour or flooding.

Ferrocement

From the experiences of project implementers in constructing anaerobic filter with ferrocement, it was

proved that:-

1) 37.7% could be reduced from the construction cost when compared to the construction with reinforced concrete.

2) Ferrocement could satisfactorily replace reinforced concrete provided that the anaerobic filters were round in shape.

3) Ferrocement tank with level lid proved to be undurable. It needed a curved lid which cost 6.7% more than the reinforced level lid.

4) Ferrocement tank proved easy to construct.

The above facts made the project implementers certain that ferrocement could be applied in the construction of other things such as rain water tank. In fact, they had applied it to construct a sludge digester at Chiengrai and Had Yai Hospitals.

Manual for the system of upflow anaerobic filter

A manual was published by the project implementers on the design, construction, operation, and maintenance of upflow anaerobic filter treatment system for hospital waste water. This manual was distributed both in Thailand and aboard.

#### 4.3 Unexpected outcomes of the project

##### 1) By-products from upflow anaerobic filters

1. less use of space
2. much lower operation, and maintenance costs
3. ammonia salt was obtained as a by-product by the addition of chlorine, which could be used as fertilizer.

##### 2) Unwanted products from the system

1. Volatile fatty acid was detected from the smell of ammonia and organic matters at Ayudhya Hospital, resulting in the use of a greater amount of chlorine.
2. A big amount of reducing agent was derived from the treated water, which, if not properly oxidized, could reduce the amount of oxygen in the river.

#### 4.4 Conditions for success

1) It has already been the duty of the Division of Environmental Health to treat waste water from hospitals.

2) The project implementers were well qualified in the construction, management, implementation of the project, and maintenance.

3) Follow-up of work was carried out regularly. The officers from the Division had often supervised work on construction.

4) Operation and maintenance were efficient; Ayudhya Hospital could be reported to hold good record

for maintenance of equipment.

5) The system was efficient because:-

1. It could dispose 97.8% of organic matters and 99.9% of enzymes.

2. It was completely smell-proof. No complaints were reported from the users (hospital officers and patients).

3. The chlorine content in the discharged water was 0.5-1.0 ppm. which was not harmful to the community.

4 There were many other advantages when compared to other systems. (Appendix 2.4)

#### 4.5 Application of results

The knowledge and results of this project were utilized by the Division of Environmental Health in the installation of this waste water treatment at other hospitals. There were other interested sectors, eg., the Municipal Power Supply, the KMIT (Thonburi) who asked for information concerning the system.

#### 4.6 Benefits of the project

There was a lot of benefits obtained from this project as discussed in 4.5 and in the next topic.

#### 4.7 Production of technology

The following techniques were obtained :-

1) The design and construction of upflow anaerobic filter system of waste water.

2) The construction of anaerobic filters with ferrocement.

3) Criteria for the use of upflow anaerobic filter system in a hospital.

4) Operation and maintenance of upflow anaerobic filter system.

5) The use of ferrocement to construct a sludge digester and rain water tank.

#### 4.8 The extension of project's result

A continuing research project was conducted after the completion of the project to reduce ammonia and volatile fatty acid resulting from upflow anaerobic filter.

The project implementers wanted to apply this treatment system in slaughterhouses where a lot of contaminants were detected in the discharged water.

The project implementers disseminated the details of upflow anaerobic filters and the process of making ferrocement to departments and agencies in the country and abroad.

The results to be disseminated were:

- 1) The use of ferrocement in place of reinforced concrete.
2. The application of upflow anaerobic filter in factories, eg. slaughterhouses and sugar mills.

#### 4.9 Information

1. At the beginning stage, the officers from the Division of Environmental Health gave lectures to Ayudhya Hospital's officers on waste water and garbage treatment.

2. Next, the hospital arranged lectures and trainings on waste water treatment to heads of different units in the hospital.

3. Announcements were made for the patients and relatives about the hospital's waste water treatment system.

4. The hospital's officers gave information and explanations of the technology to interested people.

5. A field trip was made for officers from Uthaithani and Nakornpanom Hospitals.

6. The Division of Environmental Health provided information on techniques of this project to interested people.

7. The manual on design, construction, operation and maintenance of upflow anaerobic filter treatment system for hospital waste water was distributed to individuals and relevant institutions.

#### 4.10 Policy obtained from the project

Criteria were obtained for the selection of upflow anaerobic filters.

- 1) The system proved efficient in hospitals with limited space.

- 2) It proved effective in hospitals where buildings scattered by installing an upflow anaerobic filter for each building or group of buildings.

- 3) It could be used in the treatment of waste water at each point.

- 4) There was no problem concerning the budget for construction, equipment and maintenance.

If water was to be reused, the Division then recommended stabilization ponds to be used with upflow anaerobic filters.

#### 4.11 Potentials

1. Ammonium salt could be used as fertilizer. The hospital could utilize the discharged water for watering its plants.

2. Biogas is another by-product of upflow anaerobic filter. However, not enough biogas was obtained at Ayudhya Hospital for any use.

Following are the business potentials of the waste water treatment carried out by this project.

1) The system could be installed at slaughterhouses, the waste water of which contains a lot of contaminants.

2) The system could be installed at sugar mills.

If oxidation ditch or stabilization ponds were used, there would be a lot of pungent smell.

3) The system could be installed at big hotels which are usually situated among houses or business centers, and have limited space.



### Part III

#### Conclusion and Recommendations

It can be concluded that the following major impacts have been brought about by the IDRC-supported project in medicine and public health:

- 1) Certain products
- 2) Implementation techniques/devices
- 3) Policies/working systems
- 4) Utilization of information obtained from the project
- 5) Improved community health

However, there have been limitations as to the project's potentials and extendability.

#### 5.1 Produces and Products

It was expected from the Supplementary Food Project to obtain products from supplementary food formula, made of rice, beans, and sesame. However, the production had to stop when the project ended, owing to lack of stimulation.

From the project on the Improvement of dermatological practice, the ability of general physicians have been increased; manuals on common skin diseases, a very useful case history form for patients with skin diseases, have been produced.

The project on Hospital Waste Water Treatment has yielded a satisfactory system and a technique of making ferrocement which is also technically essential.

#### 5.2 Techniques and approaches

The following techniques and approaches have been obtained:-

- 1) An approach towards cooperation of work
- 2) Planning and management at a village level
- 3) Training
- 4) Data processing
- 5) Dissemination of research results
- 6) Making the research result a policy
- 7) Application and distribution of information
- 8) Specific techniques and devices

#### Approaches towards cooperation

Food supplementary project succeeded in obtaining cooperation from the villagers. The project implementers' experiences in this respect could be applied in other community projects.

The Project on the Improvement of Dermatological Practice created cooperation and participation between the project implementers from the Institute of Dermatology and the trained general physicians working at different provincial hospitals.

The Project on the Development of Appropriate and Economic System for Hospital Wastewater created cooperation between Ayudhya Hospital's officers and the project implementers in the operation, control, and maintenance of the system.

#### Planning and Management at a Village Level

Food Supplementary project has created experiences for its implementers in planning and management of villages which involve each village's infrastructure.

#### Training

Techniques have been obtained for the organization of training courses at a national level from the Improvement of Dermatological Practice Project.

#### Data Processing

The first project used the information-gathering techniques as its base-line data and evaluation. The second project on dermatology obtained techniques of compiling statistical data of the incidence, prevalence, and other statistics of skin diseases. The third project utilized the data-collection techniques of construction, operation, and maintenance of the system rather than processing data.

#### Dissemination of Results

The extendability of the results of the three projects depended on the project's dissemination techniques. The Food Supplement Project disseminated its results through the holding of seminars, and workshop, through publication of the results in different journals, and through the organization of field trips, extending the results on a large scale.

#### Making the Research Result a Policy

The approaches in this respect are nearly similar to those for the dissemination of results. However, to succeed in making a policy at any level, the project

implementers should take part as one policy maker of that level.

#### Application and Distribution of Information

The specific techniques and devices were obvious in the project on the system of upflow anaerobic filters. They are as follows:-

1. The design and construction of upflow anaerobic filter system.
2. The construction and use of ferrocement.
3. Criteria for the operation of upflow anaerobic filter system in a hospital.
4. The operation and maintenance of this system.

#### 5.3 Policy

It can be said from the evaluation of the three project, that the following policies have been obtained:

The Food Supplement Project created a policy on the necessity for children to have supplementary food if they are from needy families. The policy on the construction of an upflow anaerobic filter treatment of waste water is obtained from the project on upflow anaerobic filter. And for the project on dermatological practice, the arising policy is the quality development for general physicians.

There are many factors which can influence the policy makers, for example:-

- 1) The research topic being of interest to the policy makers, or already being the national, or regional policy.
- 2) The relationships between the policy makers and the researchers.
- 3) The effectiveness and efficiency of the dissemination of research results.

#### 5.4 Information

The Food Supplementary Project distributed its information on a very large scale. This is owing to the fact that the project implementers are well qualified and full of abilities.

The researchers of the second project are also very qualified. The information has been disseminated widely within the country and abroad, making it very useful for medical and public health circles of Thailand.

Information on the upflow anaerobic filter and ferrocement have been distributed among interested groups of people. It is suggested that the following steps should also be conducted:-

1) producing a video tape on hospital waste water treatment for the Division of Environmental Health to show to relevant sectors and interested groups of people, or to show in a course of training and in exhibitions.

2) Producing slides for use when video tape is not applicable.

3) Ayudhya Hospital (Social and Preventive Medical Section) should follow up the use and result of this waste water treatment system and produce technical papers to disseminate the idea.

## 5.5 Population and Community Health

No numerical data were available to make a systematic comparison between the health of population and community before and after the research projects. However, observations and interviews implied that the impacts of the three projects have improved the population and community health.

## 5.6 Extension of the Research Projects

Extension of the research project through the dissemination of research results have already been discussed above. For the Food Supplementary Project, it is unfortunate that the food formula has had some restricting factors towards a wide range of consumption. The improvement of dermatological practice is still going on among keen physicians who had been trained. For the last project, the extension of the treatment system of waste water in other hospitals would require budget and other factors.

## 5.7 Business Potentials

It is evident that the supplementary food formula has no business potential. The second project has a potential for dermatological trainings in private hospitals and clinics. However, careful considerations are needed before practice. The third project has a potential for the waste water treatment system to be installed in hotels, factories, schools, and big buildings such as condominiums, etc.

## 5.8 Recommendations

The evaluations of the impacts of the three project have shown that:-

1) The purpose and trends of evaluation should be taken into account together with the evaluative and research criteria and methods to determine the approaches

and processes of evaluation.

2) It was impossible to conduct a quantitative analysis in this evaluation, since it was extremely difficult to obtain numerical data from the three projects.

The evaluation of the research impacts should be planned at the same stage as the planning of the project, in order to

1) know what is or what is not the impact of an on-going project, of a completed project, and of a project which has been completed for some time.

2) determine suitable personnel or suitable agency/department to evaluate the impacts.

3) allow time for the evaluators to work and follow up the project's impacts as closely as possible.

4) allow the project implementers and the impact evaluators to consider the plan and the results of the evaluation together.

5) obtain adequate data for a quantitative analysis of the evaluation.

In this evaluation of the projects impacts, the evaluators have based their evaluation on the purpose and the trends of evaluation as already mentioned, and followed these procedures:

1) read all the projects' papers, drawing out the main topics to be evaluated.

2) read the papers containing the topics to be evaluated, noting the details.

3) consult the project implementers as to the details in 2).

4) construct a questionnaire or an information sheet.

5) distribute the questionnaire to the project implementers to fill in, or use the information sheet to interview them and the relevant persons.

6) meet and interview the project implementers and relevant personnel to obtain as much information as possible which is both valid and reliable.

7) consider the information from no. 2), 3), 5) and 6), use the qualitative analysis to make an inference of the impacts.

8) draft a conclusion report from 7).

9) revise the report to make the final conclusion and recommendations.

Appendix 1.1  
Papers Used to Study the Project Background

Food supplement project

1. Village food production and processing outreach program. (IDRC proposal, phase I) (sheets)
2. Food processing centres (Thailand) Phase II (IDRC proposal, phase II) (sheets)
3. Formulation of supplementary infant foods at the home and village level in Thailand. (sheets)
4. Village food production and processing outreach program, phase I (1979-1981) (sheets)
5. Village food production and processing outreach program phase II
6. Village food production and processing outreach program: phase II, A report on the implementation and economic feasibility of the project. (sheets)
7. Progress report, Phase II (1982-1983)
8. Home and village prepared weaning foods in Thailand. (sheets)
9. Progress report (1979-1980), village food production and processing outreach program. (sheets)
10. Proceedings of workshop on home and village prepared supplementary food practices in Asia, Bangkok, Thailand. (28-30 october 1983)
11. Implementation of a conceptual scheme for improving the nutritional status of the rural poor in Thailand. (sheets)
12. Improvement of nutritional status through infant food implementation at home and village levels. (sheets)

The Project "Improvement of Dermatological Practice in Thailand

1. The report on improvement of dermatological practices in Thailand.
2. Description of the project on improvement of dermatological practice in Thailand
3. Dermatological record
4. Manual on analysis and follow-up of dermatological diagnosis and treatment using dermatological record of IDRC project.
5. Manual on analysis and follow-up of dermatological diagnosis and treatment using dermatological record of IDRC project.
6. Handbook of common skin diseases in Thailand
7. Proceedings conference on Restoration and Promotion of Dermatological Physicians (March 15-16, 1982)

The Project "Development of Appropriate and Economic Treatment System for Hospital Wastewater"

1. Final report on development of appropriate and economic treatment system for hospital wastewater.

2. Manual on design, construction, operation and maintenance of upflow anaerobic filter treatment system for hospital wastewater.

3. Final report on development of appropriate and economic treatment system for hospital wastewater.  
(Executive report)

Appendix 1.2  
informants

Food Supplement Project

1. Professor Dr. Aree Valyasevi (M.D.)  
Director of Nutritional Research Institute,  
University.
2. Professor Dr. Sakorn Dhanamitta (M.D.)  
Nutritional Research Institute, Mahidol  
University.
3. Dr. Somjai Wichaidit  
Nutritional Research Institute, Mahidol  
University.
4. Mrs. Suwannee Dhamjaroen  
Nutritional Research Institute, Mahidol  
University.
5. Mrs. Pensri Poocharn  
Former Project Implementer (at present living at  
Ban Nong Hai, Pibun Mangsaharn District,  
Ubonrajthani).
6. Dr. Weerachai Patawan (M.D.)  
Director of the office of Public Health  
Administration and Technical Matter,  
Ubonrajthani
7. Mr. Pan Puengpeng  
Village Headman, 5th Section, Tambon Ban Dang,  
Trakarn Puetpon District, Ubonrajthani
8. Mr. Pak Wongkham  
Headmaster of Ban Dang Boonserm Uthit School,  
Tambon Ban dang, Trakarn Puetpon District,  
Ubonrajthani
9. Miss Montha Waiprom  
Teacher at Ban Lai Sugn School, Trakarn Puetpon  
District, Ubonrajthani.
10. Mrs. Khampong Thana  
Member of housewife group, Ban Lai Tung,  
Trakarn Puetpon District, Ubonrajthani.
11. Miss Poonsook Surathamnan  
Health Promotion officer, Ban Lai Tung,  
Trakarn Puetpon District, Ubonrajthani.

the Project "Improvement of Dermatological Practice in  
Thailand"

1. Dr. Renoo Kotrajaras (M.D.)  
Former Director of the Institute of Dermatology
2. Dr. Kritsada Duang-urai (M.D.)  
Doctor at Pra Mongkut Hospital
3. Dr. Paiboon Watcharachiwin (M.D.)  
Doctor at Choburi Hospital



The Project "Development of Appropriate and Economic Treatment System for Hospital Wastewater"

1. Mrs. Nitay Mahabhol  
Director of the Division of Environmental Health, Department of Health
2. Mr. Nirut Khunpol  
Engineer, Division of Environmental Health, Department of Health
3. Dr. Ratana Paliwanit (M.D.)  
Director of Ayudhya Provincial Hospital
4. Dr. Potjanart Soitong (M.D.)  
Deputy Director of Ayudhya Hospital
5. Dr. Pichet Janta-issara (M.D.)  
Head of Social and Preventive Medicine Section, Ayudhya Hospital
6. Mrs. Somkit Hirunyupakorn  
Epidemiological Nurse, Social and Preventive Medicine Section, Ayudhya Hospital

### Appendix 1.3 Possible Indicators for Evaluation

From the workshop on "Model Construction for the Evaluation of Impacts from Projects Supported by IDRC", conducted by the DTEC, November 14-15, 1986.

1. Acceptance of the target groups
2. Extension of the project
3. Production investment (If there is production)
4. Storage of products (when there is any product)
5. Use of labor
6. conditions of physical environment
7. Conditions of social environment
8. Appropriateness of technology used
9. Alteration of arising technology (in and outside of the project)
10. Innovation
11. Knowledge acquisition of the project implementers
12. Training of others
13. By-products of equipment and technical papers
14. Changes of individual, household, and community health among target groups
15. Changes of health servicing for target groups and other relevant groups
16. Changes of health system of target groups
17. Cooperation from community

Appendix 1.4  
Questionnaire Used in Evaluation of Impacts

Required data collected by.....  
Position in project.....  
For Project .....  
Overall objective.....  
Specific objectives   a.....  
                          b.....  
                          c.....  
                          etc.....

1. Did project achieve the objectives ?

		Yes	No
Overall objective			
Specific objective	a	,	,
	b	,	,
	c	,	,
	etc.		

2. What are the activities of the project ?

	completed	Not Completed
a		
b	,	,
c	,	,
d	,	,

2.1 What results) is (are) obtained from the completed activities ?  
.....

2.2 How are they achieved ?  
.....

2.3 If not achieved, why is it not achieved ?  
.....

3. Please state the results (expected and unexpected) of the project.

3.1 Expected results  
a.....b.....c.....d..... etc.

3.2 Unexpected results  
a.....b.....c.....d..... etc.

4. What has been done in order that the results are used on a wider scale ?  
.....

5. Do you want the project results to be extended all over the country ?  
.....

5.1 If yes, which results ?  
.....

5.2 How can IDRC support in this respect ?  
.....

6. What are the business potentials of the research results and project implementation ?  
 .....  
 If yes, how ?  
 .....
7. What are the results and information obtained from the project ?  
 .....  
 7.1 What have directly been applied ? How? What outcomes ?  
 .....  
 7.2 What have indirectly been applied ? How ? What outcomes ?  
 .....
8. Who obtain the benefits from the project ?  

	many	average	a few	none
Project leader	3	2	1	0
Project researchers				
Project workers				
Population at project site				
Local governmental section				
Others (please state).....				
9. Is there any continuation of work results ? (by the Institute/Governmental section of the researchers  
 No  
 Yes, in terms of implementation by an agency or department  
 Yes, in terms of advices given by agency/department  
 Yes, without any specific agency  
 Yes, in terms of davices but without any agency
10. Is there any policy arising from the implementation of the project ?  
 10.1 If yes, who takes it to practise ?  
 10.2 What level is the policy ?  

International	National	Regional
Provincial	District	Tambon or village
- 10.3 How is it promoted to an international policy?  
 .....  
 10.4 How is it promoted to a national policy ?  
 .....  
 10.5 How is it promoted to a regional policy ?  
 .....  
 10.6 How is it promoted to a provincial policy ?  
 .....  
 10.7 How is it promoted to a district polocy ?  
 .....  
 10.8 How is it promoted to a Tambon or village policy ?  
 .....

10.9 Is it useful to the policy makers ?

.....

11. When the project is completed, is there any arising in plementation technique ?

.....

If yes, who uses the technique ?

.....

12. When the project is completed, is there any arising Implementation system ?

.....

If yes, who uses the system ?

13. When the project is completed, are there any arising recommendations with respect to the discipline ?

.....

If yes, what are they ? Who uses them ?

- a. Recommendation No. :.....

User .....

- b. Recommendation No 2:.....

User .....

etc.

14. To whom has the information been given to ? How ?

- a. Information on .....

Given to..... Through.....

- b. Information on .....

Given to..... Through.....

etc.

15. Has there been any exchange of information with other projects, section, or any other work

- a. Information on .....

Given to..... Through.....

- b. Information on .....

Given to..... Through.....

16. Who was the target population ?

a.....

b.....

etc.

17. Did the target population accept the idea ? How ?

.....

Besides yourself, who do you think will be able to give information for the evaluation of impacts of this project ?

Name .....

Address.....

Name.....

Address.....

Appendix 2.1  
Time/Work Schedule for the Food Supplementary Project

Phase I

a) Nong Hai village in Phibun District.

After changes resulting from the integrated health, nutrition and manpower development project (1977-1979), there were following important activities.

1. Implimentation and food supplementation (beginning of Month 1)
2. Evaluation of weight (Month 12)
3. Evaluation of effort (Month 16)
4. Evaluation of weight (Month 19)
5. Evaluation of weight (Month 22)
6. Project revision (Month 22-23)

b) Lai-Tung, Lai-Soong, and Ban-Dang villages of Trakarn District.

After the natural changes in the villages, the important activities were:

1. Preparating phase (Month 1 through Month 3)
2. Implementation (beginning of Month 4)
3. Evaluation of weight (Month 12)
4. Evaluation of effort (Month 16)
5. Evaluation of weight (Month 19)
6. Evaluation of Weight (Month 22)
7. Project revision (Month 22-23)

Phase II

The important activities were:

- 1) Determine the economic feasibility of marketing infant food product at the Nong-Hai FPC for the ten villages in the project site.
- 2) Assessing demand for infant food in the 10 Villages.
- 3) Test the marketing of the product through one outlet.
- 4) Study the cost, availability and potential supplier of the materials for production of supplement formula.
- 5) Assessing various methods of product distribution for effectiveness, ease of management and reliability of cost.
- 6) Advertising the product by various promotional techniques (radio annoucement, printed material, distribution of sample, video-tape, display in the village health and agricultural offices.)
- 7) Running a pilot food processing, in relation to the project conducted by the Food Technology Department of Chulalongkorn University, at Nong-Hai FPC.
- 8) Review the food processing activities and services provided in order to determine the additional food processing requirement in the villages.
- 9) Routine consumer survey of the prices.

- 10) Estimate the cost of production
- 11) Identification of interested entrepreneur.
- 12) Modification of food processing, management, and marketing system to reduce costs and reach the identified market.
- 13) Weekly record for inventory, sales, costs, and returns.
- 14) Determine incidence of malnutrition among children 0-4 years old in the ten villages before selling of the product, and reassess after 6 months of selling the product, to find the number of households using the infant food formula, the effect of marketing, and nutritional status.
- 15) Conducting workshop in Nong-Hai to review the results. Participants were potential FPC operators, raw material suppliers, product distributors from the ten villages.

Appendix 2.2  
Supplementary Formula or Supplementary Food Mixture

Accepted formulas

1. Rice + Soy bean + Sesame
  2. Rice + Soy bean + Groundnut
  3. Rice + Mung bean + Sesame
  4. Rice + Mung bean + Groundnut
- 70:15:15 by weight

Not accepted

1. Rice + Fish meal + Sesame
2. Rice + Fish meal + Groundnut
3. Rice + Fish meal + Oil

Processing

	Rice	Mung bean	Sesame
Roast (metal pan)	5-10 min	3-5 min	3-5 min
Weighing (Simple weighing machine)	70	15	15
Grinding (Ce Co Co electric machine or Manual grinding machine)			

Mix

Supplementary Food Mixture

Cooking

1. part of mixture and 6 part of water (by weight) boil for 10-15 minutes
- green leaf vegetable may be added

Amount per day

1. Age < 6 months: 20 grams
2. Age 6-12 months: 40 grams
3. Age 1-2 year: 60 grams
4. Age > 2 years: 100 grams

Acceptability > 90 percent in 6 months - 2 years children

Effectiveness

2nd and 3rd degree malnourished children gain weight within 4-6 months.



# Appendix 2.3 Maintenance Table For the Waste Water Treatment System

## Every day

- Check garbage /smell receptacle
- Check receptacle for centeen garbage in pumping pond
- Measure chlorine
- Check garbage receptacle
- Measure sediment

## Every month

- Check the pump
- Record power unit

## Every six months

- Apply rustproof paint on steel parts
- Check lubricant in the pump
- Inject power-contact liquid cleaner
- Change gear lubricant

## Every two years

- Wash all piping systems

## Spare materials

- Belt
- Grease
- Lubricant
- Electrical equipment
- Powder chlorine and analytical liquid (not for over than 6 months)

## Every week

- Measure temperature
- Grease necessary parts
- Check gear lubricant
- Check the belt
- Check the lawn
- Check the lawn

## Every three months

- Check fat receptacle
- Check bearings
- Clean power board

## Every year

- Change pump's lubricant

#### Appendix 2.4

### Comparison of Advantages and Disadvantages of Anaerobic filter system, Oxidation Ditch (aerobic), and stabilization Ponds

1. Anaerobic Filter System
  - 1) Dispose organic matter efficiently (97.8 %)
  - 2) Dispose enzyme efficiently (99.9%)
  - 3) Save the use of land area
  - 4) Lower operation/maintenance cost
  - 5) Using a lot of chlorine
  - 6) Ammonium resulting from use of chlorine can be used as fertilizer
  - 7) Consuming more power than stabilization ponds but about the same as oxidation ditch
2. Oxidation Ditch
  - 1) Dispose organic matters efficiently
  - 2) Dispose enzymes matters efficiently
  - 3) Requiring large area
  - 4) Consuming less chlorine than anaerobic filter
  - 5) Nitrate salt resulting from chlorine can be harmful
  - 6) Consuming more power than stabilization ponds
3. Stabilization ponds
  - 1) Dispose chemicals efficiently
  - 2) Dispose enzymes
  - 3) Requiring very large area
  - 4) Consuming less chlorine than anaerobic filter
  - 5) Consuming less power than the other two systems